in expansive working, as moist steam being a better conductor of heat than dry, parts with its heat more rapidly to any neighboring conducting material of a lower temperature. It is not by the addition of a steam jacket that the evil of condensation, attendant upon the rate of expansion, can be averted, as this will necessarily take place from the constancy of natural laws; but the liquefaction will take place in the steam jacket, instead of the cylinder, with entirely different results. Condensation in the former case can do no serious harm; for instead of being lost in the condenser, and carrying off heat, it is returned to the boilers by a return pipe, proceeding from the bottom of the jacket.

From the results of extended practical observation of the duty developed by the various descriptions of English pumping engines, the Cornish stands pre-eminent for its remarkable economy; the duty in one case, having amounted to 130,000,000 pounds of water raised one foot high by 112 pounds of coal. Future developments looking to an increased rate of economy, may be looked for in the possible adaptation of the compound principle applied to the Cornish type.

W. M. HENDERSON,
Hydraulic Engineer.

Philadelphia, May 9th, 1868.

PATENTING A PRINCIPLE.

(Concluded from page 414.)

It is unnecessary to go through all the cases in the English books to which this explanation applies. One, which was determined by our own Supreme Court, deserves to be noticed here, especially because it was considered at the same term with O'Reilly *v.* Morse, and both must have been together in the minds of the judges—that of Winans *v.* Dennacad, 15 How. 330. The plaintiff's invention consisted in constructing coal-cars in the form of the frustum of a cone. The defendant's cars were octagonal instead of circular, but otherwise resembled the plaintiff's. One of the judges inclined to the opinion that the plaintiff was, by the terms of his patent, limited to the precise form he had described, and could have no remedy against others who used a different one. It was shown that there was no practical difference between the two; but either

would derive especial strength from the mechanical law involved. And, though the plaintiff's claim was, in express terms, to the frustum of a cone; though he did not pretend to claim the mechanical law thus applied, the defendant was held to have violated his patent. This could not be on the ground that the principle of mechanics was patented. It must have been on the ground that the form adopted by the defendants was a mere equivalent for that of the plaintiff.

It may be said that what have been designated as mechanical laws in the preceding pages, are in truth laws of nature, physical just as much as the properties of matter, and that the two classes run into each other, so that no distinction can be made between them. It is not necessary to insist that there may be in theory. In practice, there is a radical difference which fully justifies their being considered as belonging to two classes. In the case of inventions founded on what have been termed mechanical principles, the patentee obtains full protection in the exclusive enjoyment of the principle by being allowed an action against every one who uses an equivalent for his device. No machine can be constructed on the principle of his which does not embrace such equivalents. It may not be so where the novelty of the invention consists in some property of matter first brought to light by the patentee. Neilson's patent covered the use of a vessel for heating air placed between the blower and the furnace—not the introduction of heated air into the furnace, which was truly his discovery. If any one could have contrived to heat the air sufficiently before it entered the blower, he might have availed himself of Neilson's discovery with impunity. The difficulty of doing this constituted the whole strength of his patent. Anybody might have availed himself of the quality of lead discovered by the Tathams, if he could have got up a machine of a different construction. It is very possible that the courts may give a larger range to the doctrine of equivalents, in order to secure to the discoverer of a new physical property an adequate reward for his ingenuity. Thus far, it is only as the defendant has been found to have employed mechanical equivalents for the construction specified by the patentee, that he has been held guilty of infringement, or the patentee has obtained protection.

There are a few other cases upon this subject which are not open to the explanation given to those heretofore mentioned, and which may be thought to require a passing notice.

The plaintiff in Forsyth *v.* Riviere, 1 W. P. C. 97, after describing in his specification the explosive compounds employed by him in igniting the charge in fire-arms, added: "I do not lay claim to the invention of any of the said compounds," &c., "my invention in regard thereto being confined to the use and application thereof to the purposes of artillery and fire-arms as aforesaid. And the manner of priming and exploding which I use is," &c., proceeding to describe it. There was no specification of claim. It is manifest that this patent was for the method he employed. It is true that the reporter says the defendant's lock was constructed differently; but he does not furnish the slightest intimation in what respect it varied. The note of the case is very short and unsatisfactory. The report, bearing the same title in Chit. Pr. C. 182, is upon another point entirely. But from the statement of the counsel in Minter *v.* Wells, W. P. C. 128, we learn that all the difference between the locks was this: in the patentee's the hammer struck the pan containing the composition, and in the defendant's the pan struck the hammer.

No one can read the patent of the plaintiff in Hall *v.* Boot, 1 W. P. C. 100, without perceiving that he laid claim to his machinery when used in connection with gas flame. There was no positive evidence what machinery the defendants used, it is true; but this does not warrant the inference that the court recognized the plaintiff's title to the exclusive use of gas flame with any machinery for the same purpose. There was circumstantial proof of the strongest kind that the defendant's was borrowed from the plaintiff's, and was identical with it.

The claim set up in Booth *v.* Kennard, 1 Hurls. & N. 527, was for "making gas direct from seeds and matters herein named for practical illumination, or other useful purposes, instead of making it from oils, resins, or gums previously extracted from such substances." Upon the trial of the case, POLLOCK, C. B., held this claim to be too broad, and directed a verdict for the defendant. The verdict was set aside in the Court of Exchequer Chamber; and from the report it would certainly seem as if the court considered the patent valid. But when the cause came on for trial again before Chief Baron POLLOCK, he said that the court had decided nothing more than this: that the invention "was one which, if new, might be patented if properly specified." He added, "we are also of opinion that the claim is too large, and that such claim cannot be

supported." There was a verdict for the defendant again. But as there was also strong evidence upon that trial that the invention was not new, the plaintiff probably deemed it unsafe to proceed any further, after moving that a verdict should be entered up for him, and being denied. Little or no reliance is manifestly to be placed on the report of the decision in the Exchequer Chamber, after the explanation given by Chief Baron POLLOCK.

The plaintiff in Seed *v.* Higgins, 8 Ell. & Bl. 755, 771, and 6 Jur. N. S. 1264, had originally taken out a patent for the application of the law or principle of centrifugal force to the particular or special purpose above set forth;" *i. e.* to fliers used for preparing, slubbing, or roving cotton, &c., so as to produce a hard and evenly compressed bobbin. He afterwards discovered that centrifugal force had been employed already for the same purpose, though by different means; and he therefore filed a disclaimer, by which he limited himself to the mechanism he had described in his specification. Upon this a a question arose whether his patent did not, when thus amended, appropriate a different invention from anything embraced in his original specification, and was not therefore void. The case was very fully discussed in several courts, but was finally decided against the plaintiff upon the ground that the defendant's machine was no infringement of the patent. In the course of delivering their opinions it was incidentally mentioned by one or more of the judges, that the defendant's machine came within the purview of the patent as originally framed. But there was no opinion expressed throughout as to the validity of the original patent, nor any allusion made to the subject. If it may be inferred from the silence observed respecting it that the validity of the instrument was admitted, there is some propriety in referring to the case when examining this doctrine. It will probably be regarded by most as of no weight whatever.

The court interpreted the second claim made by the plaintiff, in Bovill *v.* Keyworth, 7 Ell. & Bl. 724, to be for "exhausting the air from the cases of the millstones, combined with the application of a blast to the grinding surfaces." Upon this, Lord CAMPBELL, who presided, remarked as follows, viz.: "Still if the specification does not point out the mode by which this part of the process (No. 2) is to be conducted, so as to accomplish the object in view, it would be a statement of a principle, and the patent would be invalid." He held it to be sufficient, however. And it may well be doubted

whether it was fairly open to the objection that it would have been for a principle without a description of the process, though such a description was no doubt essential. The case belongs to a class which has been often supposed to involve the legality of patenting a principle, but really has little to do with it. A blast and an exhaust are two mechanical forces as well known as a stream of water or as steam. Every artisan skilled in the business is perfectly familiar with them, and knows how to produce them. The invention in this instance consisted in combining the two so as to produce a particular effect. After describing how this might be done, the specification defines the invention as consisting in the combination of these two forces, each applied to a particular and well known mechanism. In all this we see nothing like patenting a principle, and apprehend there was no foundation for the remark of his Lordship. He may have had an idea that the patent would have been defective in not specifying some visible structure as the invention; but that is very different from patenting a principle. The case has little or no bearing on that subject.

From this discussion and examination of the cases the following conclusions are legitimately drawn:

1. Every discoverer of a new and useful application of any law of nature, any quality of matter, or any mathematical principle, is entitled to a patent for it.

2. It is not necessary to entitle him to a patent, that he should have been the first to search out and make known the law, quality, or principle which he has thus applied. And his having been the first to bring it to light adds nothing to his claims.

3. He will be protected in his right by holding as infringements of his patent all mechanical equivalents for the devices for carrying his discovery into effect, which he has described and designated in his specification as his invention. And he can have no other protection, even though the principle he has applied was first discovered by him.

4. No one can legally specify as his invention, and take out a patent for the exclusive use of any such law, quality, or principle when employed for the same purpose as his. No instance can be found where any such patent has been sustained, and they have been repeatedly pronounced invalid by the courts.

S. H. H.